

REMARKS

Claims 1 - 33 are pending in the application. Claims 1-22, 24-26, 28-30, and 33 stand rejected. Claims 23, 27, 31 and 32 stand allowable, but are objected to as being dependent upon a rejected base claim. Claims 1, 3, 6, 10-12, 15, 17, 18, 23, 27, 31, and 32 are amended with this response without adding new matter. New claims 34-37 are added with this response without introducing new matter. Reconsideration of the application, as amended, is respectfully requested. The Examiner's rejections are addressed in substantially the same order as in the referenced office action.

Explanation of Amendments

The specification is amended to update information to referenced patent applications. No new matter is added.

Claim 1 is amended to include that the one or more accelerometers are force feedback controlled accelerometers. Support for the amendment can be found in the application as originally filed at, e.g., page 11, lines 27-29.

Claims 3, 6, 15, 18, 23, 27, 31, and 32 are rewritten in independent form.

Claim 4 is amended to remove redundancy in view of amended claim 1.

Claim 10 is amended to include that the sensing is performed using one or more accelerometers are force feedback controlled accelerometers. Support for the amendment can be found in the application as originally filed at, e.g., page 11, lines 27-29.

Claim 11 is amended to remove redundancy in view of amended claim 10.

Claim 12 is amended for the sole purpose of correcting a clerical error. The word "the" is changed to --a--.

Claim 17 is amended to change "synchronizing the acquisition" to "synchronizing the acquisition of seismic data". The amendment corrects a clerical error and antecedent basis is in the preamble of claim 10.

New claims 34-37 are added. No new matter is added. Support is found in Figure 11-13 and the descriptions thereof.

Objections to the Specification

The Examiner objects to the specification and asserts that the application does not contain an abstract of the disclosure as required by 37 CFR 1.729b). Applicant respectfully submits that an additional abstract is not necessary. The present application is a national stage application filed under 35 U.S.C. 371 and is based on international application PCT/US00/06905. The abstract of the disclosure was properly filed in accordance with PCT Rule 8 and is shown on the front page of the international publication of the application.

The Examiner objects to the disclosure due to missing serial numbers and filing dates regarding applications referenced in pages 11, 12, 14, 19, 20, 32, and 41. Applicant has amended the description to add the missing information. Applicant respectfully submits that the amendment overcomes the objection.

Claim Objections

In paragraph 3, the Examiner objects to claim 17 as lacking antecedent basis for "the acquisition." Claim 17 is amended to change "synchronizing the acquisition" to "synchronizing the acquisition of seismic data". The amendment corrects a clerical error

and antecedent basis is in the preamble of claim 10. No new matter is added. Applicant respectfully submits that the amendment overcomes the objection.

Claim Rejections

35 U.S.C. § 112

Claims 4 and 11-13 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The Examiner asserts that the limitation "tilt" is not described in the specification. Applicant respectfully traverses, because those skilled in the art with the benefit of Applicant's disclosure would understand that the term "tilt".

The term "tilt" when used as a noun is defined in the Merriam-Webster on-line dictionary as "a : the act of tilting : the state or position of being tilted; b : a sloping surface." Synonyms of "tilt" provided by the companion thesaurus include slope, grade, gradient, **inclination**, **incline**, lean, leaning. See www.m-w.com/cgi-bin/dictionary and www.m-w.com/cgi-bin/thesaurus.

The disclosure extensively uses the term "tilt" as an operating parameter of a multi-axis sensor assembly. See page 1, lines 8-11. Tilt is also clearly used in conjunction with the inclination of a sensor assembly to the Earth's gravitational force. See page 21 lines 9-30. The use of the term "tile" is consistent with the ordinary meaning of the term as apparent from the meaning and synonyms mentioned above. Therefore, Applicant respectfully submits that use of the term "tilt" in any claim complies with the requirements of 35 U.S.C. § 112, first paragraph.

35 U.S.C. § 102

Claims 1-5, 7, 10, 11, 15, 16, and 18-25 stand rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent 6,255,962 to *Tanenhaus et al.* ("Tanenhaus") Applicant respectfully requests reconsideration in view of the amendment made herein and in view of the following remarks.

Amended apparatus claim 1 and amended method claim 10 each includes the use of one or more force feedback controlled accelerometers. Tanenhaus does not teach a force feedback controlled accelerometer. Furthermore, applicant submits that no other art of record teaches a force feedback controlled accelerometer. References to an accelerometer does not teach or suggest a feedback controlled accelerometer and references to a feedback controlled accelerometer do not teach or suggest the use of force feedback for feedback control.

Claims 3 and 15 are, respectively, original claims 3 and 15 rewritten in independent form. Each claim includes the use of a GPS for synchronizing the operation of a sensor. Independent claim 3 also includes synchronizing to a common time. Tanenhaus only teaches the use of a GPS "for providing data such as the location or position of the device being monitored over time or during travel. This GPS system, for example, can be advantageously used in military environments wherein vehicles, missiles, or other equipment travel or are shipped to various locations over time." There is no mention in Tanenhaus of using a GPS for synchronizing a sensor or synchronizing to a common time. Likewise, no other reference of record teaches such synchronizing to a common time using a GPS. Therefore, Applicant respectfully submits that original claim 3 now rewritten in independent form is not anticipated by, or obvious in view of, Tanenhaus either taken alone or in combination with any other art of record.

Amended claim 4 depends from amended claim 1 and amended claim 11 depends from amended claim 10. Applicant submits that amended claim 4 and amended claim 11 are

allowable over the art of record for the same reason as stated above for independent claims 1 and 10. Moreover, Tanenhaus does not teach a sensor providing insensitivity to tilt, which is included in claims 4 and 11. Tanenhaus describes, e.g., at column 4, lines 20-23, only a sensor that senses angle. Tanenhaus does not teach or suggest insensitivity to tilt.

Amended claim 18 is original claim 18 rewritten in independent form. Amended claim 18 includes determining the degree of coupling between the sensor module and the ground, by generating a force recording a response of the sensor assembly to the force; and analyzing the response. The Examiner asserts that such determining of ground coupling is taught by Tanenhaus, e.g., at column 5, lines 65-6:7. Applicant notes, however, that the Examiner is applying the Barr reference later in paragraph 9 of the action (rejection rational for claim 6) to provide the teaching "a crystal assembly coupled to a sensor module for providing a force in order to measure the ground coupling and vector fidelity of the sensor." It is unclear, therefore, what portion of claim 18 the Examiner believes to be anticipated by Tanenhaus. Applicant has thoroughly reviewed Tanenhaus and finds no mention of generating a force to determine the degree of ground coupling. Therefore, Applicant respectfully submits that rewritten claim 18 is not anticipated by Tanenhaus.

Furthermore, the combination of Barr and Tanenhaus does not render the claim obvious. Barr teaches a streamer, i.e., a device pulled through the water. There is no discussion or mention of determining ground coupling. A streamer is not coupled to the ground and there is no ground coupling to determine. Therefore, Applicant respectfully submits that the neither Tanenhaus nor Barr teaches and apparatus or method for determining ground coupling. Thus, all elements of claim 18 are not satisfied by the cited art.

Amended claim 21 is original claim 21 rewritten in independent form. The claim includes analyzing a looped-back bitstream for determining a malfunction of a sensor module. Tanenhaus does not mention determining a malfunction of a sensor module. Tanenhaus

discusses using a sensor module to monitor another device. Applicant does not find a discussion of a looped-back bitstream in column 5, lines 10-23 as suggested by the Examiner or elsewhere in the cited art. Therefore, Applicant submits that rewritten claim 21 is not anticipated by the cited art.

35 U.S.C. § 103

Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,255,962 to *Tanenhaus et al.* ("Tanenhaus") in view of U.S. Patent 6,512,980 to *Barr* ("Barr"). Applicant respectfully traverses.

As discussed above, neither reference teaches a force feedback controlled accelerometer. Furthermore, neither reference teaches a crystal assembly coupled to a sensor for determining the degree of ground coupling. Barr teaches a streamer cable that is not coupled to the ground and Tanenhaus teaches a sensor coupled to another device for monitoring the device. Since the combination of references does not teach all limitations of the rejected claim, then Applicant respectfully submits that the claim is not obvious in view of the references.

Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,255,962 to *Tanenhaus et al.* ("Tanenhaus") in view of U.S. Patent 6,028,817 to *Ambs* ("Ambs"). Applicant respectfully submits that these claims are allowable for the same reasons as stated for independent claim 1, because the rejected claims depend from claim 1 and thus include all elements of claim 1.

Claims 12-14, 17, 26, 28-30 and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,255,962 to *Tanenhaus et al.* ("Tanenhaus") in view of U.S. Patent 4,068,208 to *Rice Jr. et al.* ("Rice").

Tanenhaus has been previously discussed. Rice, like Barr discussed above, teaches a streamer apparatus towed behind a boat. The Examiner asserts that Rice teaches determining tilt angle of a sensor module. Rice teaches a streamer tow system that includes a device for determining pitch and yaw of the entire towed streamer. Pitch, for example is determined by use of a moveable mechanical bracket 36 coupled to a support structure 32 by a universal joint 38. These components are coupled to a synchro unit 52 by a flexible shaft and the unit 52 provides an electrical signal representative of pitch of the streamer. There is no mention of using accelerometers, determining gravity or of determining tilt of a sensor module. Applicant respectfully submits that the combination of Tanenhaus and Rice 1) do not teach every element of the rejected claims and 2) are not properly combined.

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP 2143.01 "The factual inquiry whether to combine references must be thorough and searching." Id. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). See also, Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2D (BNA) 1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'") (quoting C.R. Bard, Inc., v. M3 Systems, Inc., 157 F.3d 1340, 1352, 48 U.S.P.Q.2D (BNA) 1225, 1232 (Fed. Cir. 1998)); In re Dembiczak, 175 F.3d 994, 999, 50 U.S.P.Q.2D (BNA) 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); In re Dance, 160 F.3d 1339, 1343, 48 U.S.P.Q.2D (BNA) 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); In re Fine, 837 F.2d 1071, 1075, 5 U.S.P.Q.2D (BNA) 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is

some suggestion or incentive to do so.") (emphasis in original) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 U.S.P.Q. (BNA) 929, 933 (Fed. Cir. 1984)).

For the reasons stated above, Applicant respectfully submits that rejected claims 12-14, 17, 26, 28-30 and 33 be reconsidered.

Claims 19 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,255,962 to *Tanenhaus et al.* ("Tanenhaus") in view of publication WO 98/14800 to *Orban et al.* ("Orban"). Applicant respectfully requests reconsideration.

Tanenhaus is explained in detail above as not teaching a force feedback controlled accelerometer. Likewise Orban does not teach such an accelerometer. Orban describes a device and method of laying out a seismic cable from a spool. Orban describes the use of three-axis accelerometers in combination with three-axis magnetometers for determining orientation of the sensors. The three-axis accelerometers and magnetometers are used together to transform the actually measured seismic signal components into a desired reference co-ordinate system. Applicant finds no discussion in either Tanenhaus or Orban of 1) force feedback controlled accelerometers, determining vector fidelity, or determining orientation by generating a force at a plurality of source points.

Claim 33 is rejected based on the combination of Tanenhaus, Rice, and Orban. Applicant respectfully requests reconsideration in view of amended independent claim 10, and in view of the arguments presented above regarding the combination of Rice with other art of record.


New claims 34-37 are added without adding new matter. Applicant respectfully submits that these new claims are allowable of the cited art and requests consideration of these new claims in view of the arguments presented above.

Conclusion

For all of the foregoing reasons, applicant submits that the claims, as amended are allowable over the prior art of record. The Commissioner is hereby authorized to charge any fee due for these amendments to **Deposit Account No. 13-0010 (IO-1008US)**.

Respectfully submitted,

Date: September 26, 2003



Todd A. Bynum, Reg. No. 39,488
Madan, Mossman & Sriram, P.C.
2603 Augusta, Suite 700
Houston, Texas 77057-5638
Tel: (713) 266-1130
Fax: (713) 266-8510
Attorney For Applicants